

## Operating Systems and File Management

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- Section B: Today's Operating Systems
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## Operating System Basics

- Operating System Activities
- User Interfaces
- The Boot Process

## Operating System Activities

- An operating system is a type of system software that acts as the master controller for all activities that take place within a computer system



## Operating System Activities



	Manage memory
	Manage processor resources
	Keep track of storage resources
	Ensure that input and output proceed in an orderly manner
	Establish basic elements of the user interface

## Operating System Activities

- Multitasking provides process and memory management services that allow two or more tasks, jobs, or programs to run simultaneously
- Within a single program, multithreading allows multiple parts, or threads, to run simultaneously
- An operating system's multiprocessing capability supports a division of labor among all the processing units

## Operating System Activities

- Operating System Categories
  - Single-user operating system
  - Multiuser operating system
  - Server operating system
  - Desktop operating system

## User Interfaces

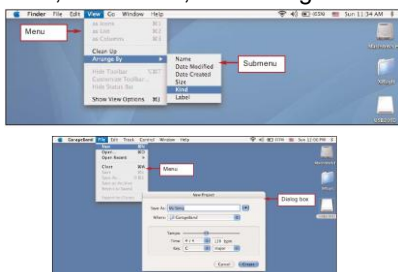
- The combination of hardware and software that helps people and computers communicate with each other

```
C:\HYBRID>PRINT
Bad command or file name
C:\HYBRID>CPA
PA_
```



## User Interfaces

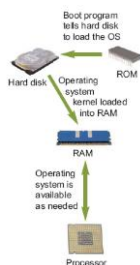
- Menus, submenus, and dialog boxes



## The Boot Process

- During the boot process, the operating system kernel is loaded into RAM
  - The kernel provides essential operating system services
- Your computer's small bootstrap program is built into special ROM circuitry housed in the computer's system unit

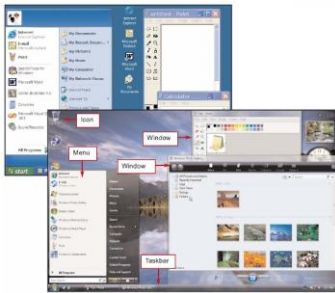
## The Boot Process



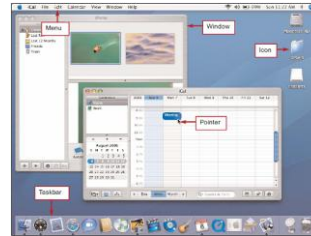
## Today's Operating Systems

- Microsoft Windows
- Mac OS
- UNIX and Linux
- DOS
- Handheld Operating Systems

## Microsoft Windows

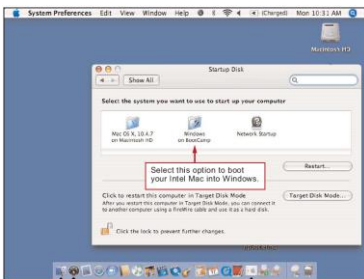


## Mac OS



You can tell when you're using Mac OS by the Apple logo that appears on the menu bar. The Mac OS X interface includes all the standard elements of a GUI, including icons, menus, windows, and taskbars.

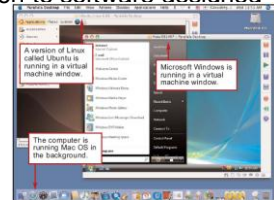
## Mac OS



On a Macintosh computer with Boot Camp, you can boot into Mac OS X or into Windows.

## Mac OS

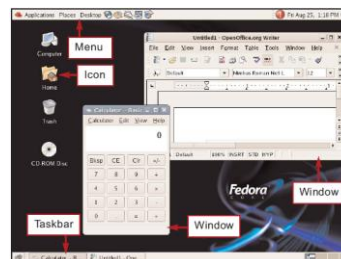
- Mac OS X on an Intel Mac offers the ability to run Windows and Windows application software in addition to software designed for the Macintosh – Dual boot



## UNIX and Linux

- Several Web sites offer a **Linux distribution**, which is a package that contains the Linux kernel, system utilities, applications, and an installation routine

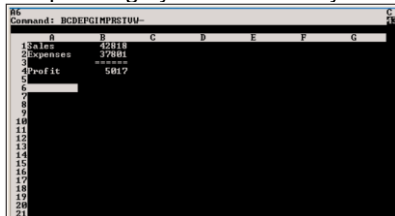
## UNIX and Linux



Linux users can choose from several graphical interfaces. Pictured here is the popular KDE graphical desktop.

## DOS

- Disk Operating System
- First operating system that many used



## Handheld Operating Systems



## File Basics

- File Names and Extensions
- File Directories and Folders
- File Formats

## File Names and Extensions

- You must adhere to file-naming conventions when saving files
  - Maximum length
  - Prohibited characters
  - No reserved words
  - Case sensitivity
- File extensions are usually related to the file format
  - Native file format



## File Directories and Folders

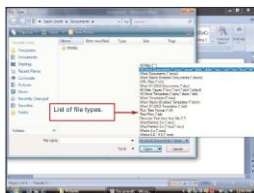
- An operating system maintains a directory for each disk, tape, CD, DVD, or USB flash drive
  - Root directory
  - Subdirectory
    - Depicted as folders
- A computer's file location is defined by a file specification, or path  
**C:\Music\Reggae\Marley One Love.mp3**

## File Formats

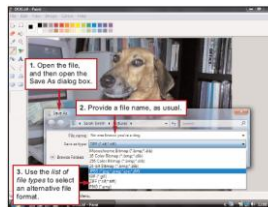
- Windows uses a file association list to link a file extension to its corresponding application software
- Although a file extension is a good indicator of a file's format, it does not really define the format
  - A file header is a section of data at the beginning of a file that contains information about a file

## File Formats

- A software application can open files that exist in its native file format, plus several additional file formats



## File Formats



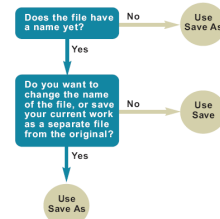
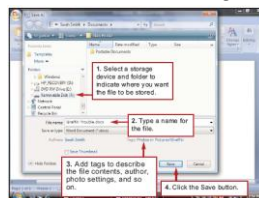
An easy way to convert a file from one format to another is to open it with an application that supports both file formats, and then use the Save As dialog box to select an alternative file format.

## File Management

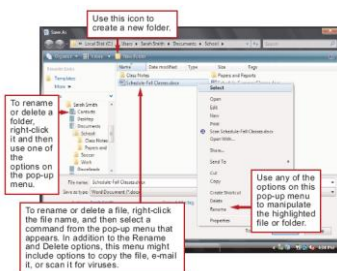
- Application-based File Management
- File Management Utilities
- File Management Metaphors
- Windows Explorer
- File Management Tips
- Physical File Storage

## Application-based File Management

- Applications typically provide a way to open files and save them in a specific folder on a storage device



## Application-based File Management



The Save As dialog box of most Windows applications uses the operating system's file management utility, so you can carry out a wide variety of file and folder tasks such as creating, renaming, and deleting files.

## File Management Utilities

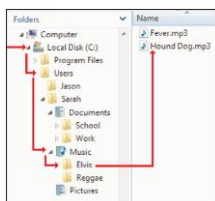
- File management utilities show you the files stored on your disks and help you work with them



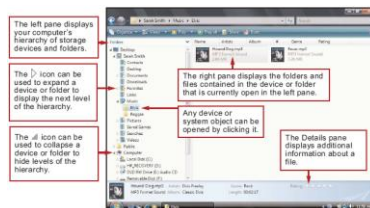
## File Management Metaphors

- Storage metaphors help you visualize and mentally organize the files on your disks

– Logical storage models



## Windows Explorer

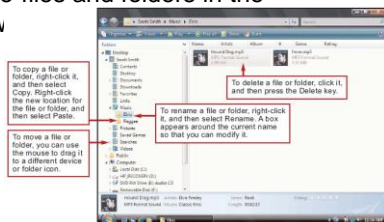


Windows Explorer makes it easy to drill down through the levels of the directory hierarchy to locate a folder or file.

## Windows Explorer

- Windows Explorer allows you to manipulate files and folders in the following v

– Rename  
– Copy  
– Move  
– Delete



## File Management Tips

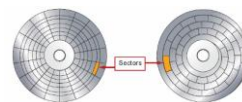
- Use descriptive names
- Maintain file extensions
- Group similar files
- Organize your folders from the top down
- Consider using the default folders
- Do not mix data files and program files

## File Management Tips

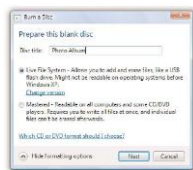
- Don't store files in the root directory
- Access files from the hard disk
- Follow copyright rules
- Delete or archive files you no longer need
- Be aware of storage locations
- Back up

## Physical File Storage

- The physical storage model describes what happens on the disks and in the circuits when files are stored
  - Storage media must be formatted before it can store files
    - Formatting utilities divide the disk into tracks and sectors



## Physical File Storage



CDs and DVDs can be created using mastering or packet-writing techniques. Mastering creates disks that can be used more reliably on a wide variety of computers and standalone players. Packet writing is more flexible for disks that you plan to use only on your own computer.

## Physical File Storage

- The file system keeps track of the names and locations of files

- NTFS
  - Master File Table (MFT)
- FAT32
  - File Allocation Table (FAT)

Master File Table		
File	Cluster	Comment
MFT	1	Reserved for MFT files
DISK USE	2	Part of MFT that contains list of empty sectors
Bio.txt	3, 4	Bio.txt file stored in clusters 3 and 4
Jordan.wks	7, 8, 10	Jordan.wks file stored noncontiguously in clusters 7, 8, and 10
Pick.wps	9	Pick.wps file stored in cluster 9

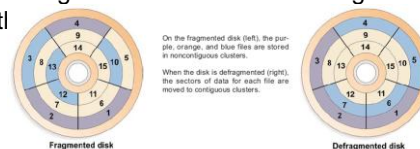


## Physical File Storage

- Deleting a file changes the status of that file's clusters to empty and removes the file name from the index file
  - The file's data is still there
  - File shredder software overwrites "empty" sectors with random 1s and 0s
- Files in the Windows Recycle Bin and similar utilities can be undeleted

## Physical File Storage

- Fragmented files are stored in noncontiguous clusters and decrease performance
- Defragmentation utilities rearrange files so



## Backup Security

- Backup Basics
- Data File Backup
- System Backup
- Boot and Recovery Disks

## Backup Basics

- A **backup** stores the files needed to recover data that's been wiped out by operator error, viruses, or hardware failures

- Decide how much of your data you want, need, and can afford to back up.
- Create a realistic schedule for making backups.
- Make sure you have a way to avoid backing up files that contain viruses.
- Find out what kind of boot disks you might need to get your computer up and running after a hard disk failure or boot sector virus attack.
- Make sure you test your restore procedure so that you can successfully retrieve the data you've backed up.
- Find a safe place to keep your backups.
- Decide what kind of storage device you'll use to make backups.
- Select software to handle backup needs.

## Backup Basics

- Your backup schedule depends on how much data you can afford to lose
- You should run an up-to-date virus check as the first step in your backup routine
- The backup device you select depends on the value of your data, your current equipment, and your budget

## Backup Basics

Device	Cost	Media Cost	Capacity	Comments
Floppy disk	\$20 (average)	25¢	1.44 MB	Low capacity is not practical for today's large files
Removable hard disk	\$150 (average)	\$50	35 GB (average)	Fast limited capacity, but disks can be removed and locked in a secure location
External hard disk	\$100 (average)	N/A	250 GB (average)	Fast and convenient, but if it is damaged, all the backups it holds are lost
Network server	Assume a business or school supplies free access	N/A	Depends on space allocated to user	Fast and convenient, but make sure that the server is regularly backed up
CD-R	\$40 (average)	15¢	680 MB	Limited capacity, can't be reused, long shelf life
CD-RW	\$50 (average)	25¢	680 MB	Limited capacity, reusable, very slow
Writable DVD	\$100 (average)	25¢	4.7 GB	Moderate capacity, reasonable media cost, higher capacity coming soon
Tape	\$2,000 (average)	\$80	200 GB (average)	Expensive for capacity equal to today's hard drives
USB Flash drive	\$15-\$500	N/A	32 MB-8 GB	Convenient and durable, but high-capacity models are expensive
Web site	N/A	\$50 per year	Depends on provider	Transfer rate depends on your Internet connection, security and privacy of your data might be a concern

## Data File Backup

- Most computers are equipped with a writable CD or DVD drive with adequate storage capacity for a typical computer owner's data files
- Store all files to be backed up in the same location
- Back up Internet connection information, e-mail folders, e-mail address book, favorite URLs, downloads and validation codes, and other configuration information

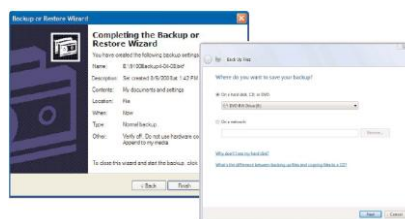
## Data File Backup

- To restore from a data file backup, you simply copy files from your backup to your hard disk

## System Backup

- To make a backup, you can use backup software
- Backup software is supplied with most tape drives and other backup devices

## System Backup

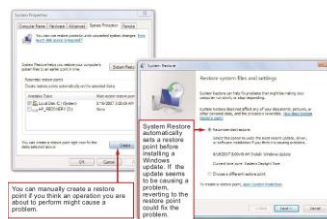




## System Backup

- A full backup makes a fresh copy of every file in the folders you've specified for the backup
- A differential backup makes a backup of only those files that were added or changed since your last full backup session
- An incremental backup makes a backup of the files that were added or changed since the last backup—not necessarily the files that changed from the last full backup
- Most experts recommend that you keep more than one set of backups

## System Backup



Restore points back up personal preferences and configuration settings stored in the Windows Registry. You can manually create restore points or let Windows create them automatically whenever you add new software or hardware.

## Boot and Recovery Disks

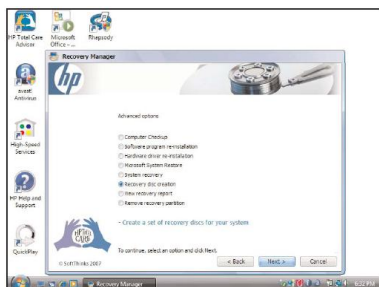
- A boot disk is a removable storage medium containing the operating system files needed to boot your computer without accessing the hard disk
  - Windows Installation CD



## Boot and Recovery Disks

- A recovery disk loads hardware drivers and user settings as well as the operating system
  - Sometimes included with new computer systems
  - Available on the Web
- Recovery partition

## Boot and Recovery Disks



## Boot and Recovery Disks

- You can create a custom recovery CD that contains your computer's current settings and device drivers
- Norton Ghost is a product of Symantec, which also provides a more specialized recovery disk called the Symantec Recovery Disk
- Certain PC manufacturers have pre-installed Norton Ghost and the recovery environment on some of their computers